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EXAMINER	
DIAMOND, ALAN D	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 01/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/773,343	SHARPS ET AL.	
	Examiner	Art Unit	
	Alan Diamond	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *37-73 and 86-111* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *37-73 and 86-111* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 October 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Comments

1. The 35 USC 112, first paragraph, rejection of claims 37, 50, and their dependent claims with respect to the term "identical sequences of layers" has been overcome by Applicant's amendment of the claims 37 and 50.

2. The 35 USC 112, second paragraph, rejection of claim 45 with respect to the term "as least in part" has been overcome by Applicant's amendment of the claim.

3. The 35 USC 112, second paragraph, rejection of claim 93 with respect to the term "said lateral conduction layer in the second region" has been overcome by Applicant's amendment of the claim.

4. Upon reconsideration, the Examiner withdraws the 35 USC 112, first paragraph, rejection of claims 47 and 90 and their dependent claims with respect to the top layer of the top cell having a first polarity and the bottom layer of the bypass diode having said first polarity. This limitation is supported by Figure 8 where the top layer of the top cell is n-type window layer 846, and the bottom layer of the bypass diode is n-type layer 860. Polarity is also discussed on page 13, at lines 1-7, and page 17, lines 13-16, of the instant specification.

5. The art rejection of claim 37 and its dependent claims over JP 9-64397 (JP '397) has been overcome by Applicant's amendment of claim 37 so as to require that that bypass diode and the subcell (to which the bypass diode is integral) have an identical sequence of semiconductor layers where each layer in the bypass diode has substantially the same composition and thickness as the corresponding layer in the

subcell. In Figure 2 of JP '397, the bypass diode has one semiconductor layer (205A) integral with one subcell and another semiconductor layer (204B) integral with a different subcell.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 37-46, 49-64, and 90-92 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 37, at lines 6-7, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 38-46.

In claim 45, at line 2, the "at least in part" range for the InGaP is not supported by the specification, as originally filed.

In claim 46, at line 2, the "at least in part" range for the GaAs is not supported by the specification, as originally filed.

In claim 49, bridging lines 2 and 3, the term "at least one of the solar cell is fabricated at least in part with GaAs" is not supported by the specification, as originally filed.

In claim 50, at lines 12-13, the "substantially the same composition and thickness" limitation is not supported by the specification, as originally filed. The same applies to dependent claims 51-64.

In claim 52, bridging lines 2 and 3, the term "at least one of the solar cell is fabricated at least in part with GaAs" is not supported by the specification, as originally filed.

In claim 90, the requirement that the top layer of the top cell has a first polarity and the bottom layer of the bypass diode has said first polarity is not supported by the specification, as originally filed. The same applies to dependent claims 91 and 92.

In claim 90, at line 9, the range of "at least one layer" for the bypass diode is not supported by the specification, as originally filed. The same applies to dependent claims 91 and 92.

In claim 92, at line 2, the "at least in part" range for the GaAs is not supported by the specification, as originally filed.

Applicant cites instant Figures 3-5 and the text describing the figures (from page 8, line 23 to page 11, line 19) for support of the term "substantially the same thickness". Applicant argues that a single semiconductor structure is etched to create to different, spaced apart devices on the semiconductor substrate, and thus, "inherent in the manufacturing process is the fact that the layers of the bypass device have substantially the same composition and thickness as the subcell since the bypass device and the subcell were formed from the sequence of layers or semiconductor structure before etching and the composition and thickness of the remaining layers is not changed by

the etching." However, this argument is not deemed to be persuasive because while it can be deduced from the instant figures and specification that the bypass device and subcell integral thereto have the same thickness and composition (see Figures 1 and 5), the term "substantially" opens up to interpretation the same composition and thickness. Such an interpretation is never discussed or addressed in the originally filed disclosure. Inherent in the instant manufacturing process is the fact that the layers of the bypass device have the same composition and thickness as the subcell since the bypass device and the subcell were formed from the sequence of layers or semiconductor structure before etching and the composition and thickness of the remaining layers is not changed by the etching.

Applicant argues that the range "at least in part" in claim 45 is supported by instant Figure 1, where the top layer of the middle cell is shown as InGaP. However, this argument is not deemed to be persuasive because, for example, the range "at least in part" in claim 45 has the upper limit that the entire second solar subcell is fabricated from InGaP. The originally filed disclosure does not support an entire second solar subcell fabricated from InGaP.

Applicant argues that the range "at least in part" in claim 46 is supported by Figure 1, where "the buffer layer of the bottom cell is shown as GaAs." However, this argument is not deemed to be persuasive because claim 46 recites "wherein the first solar subcell is fabricated at least in part with GaAs". In Figure 1, the Ge cell (104) has no GaAs. The GaAs buffer layers of the GaAs buffer (103) is not part of any of the subcells in the Figure 1. The middle subcell has three GaAs layers and an InGaP

window layer. The upper subcell has a GaAs window layer. The range "at least in part" in claim 46 has the upper limit that the entire first solar subcell is fabricated from GaAs. The originally filed disclosure does not support an entire first solar subcell fabricated from GaAs.

With respect to claim 90, Applicant argues that in Figure 8, the bypass diode (620) comprises elements (860), (862), and (864), and that each of elements (860), (862), and (864) comprises a layer. However, this argument is not deemed to be persuasive because the disclosure of three layers, i.e., layers (860), (862), and (864) for the diode is not sufficient support for a bypass diode comprising "at least one layer". The range "at least one" has practically no upper limit, and the disclosure of a bypass diode having three layers is not sufficient support for a bypass diode having practically a limitless number of layers.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 37-46 and 50-64 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 37, at lines 6-7, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 38-46.

Claim 50 is indefinite because it is not clear which of the plural subcells at line 4 is being referred to by the term "the subcell" at line 11 of claim 50. The same applies to dependent claims 51-64.

In claim 50, at lines 12-13, it is not clear what is to be encompassed by the term "substantially the same composition and thickness". The same applies to dependent claims 51-64.

Applicant argues that the "term 'substantially the same thickness' refers to the fact that each layer in the sequence of semiconductor layers in the bypass device and have the same composition and thickness as the corresponding layer in the subcell." Applicant's argument is not deemed to be persuasive because it is not clear how close to having the same thickness the corresponding layers must have in order to be considered to have "substantially the same thickness".

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 47-49, 90-93, 95-98, 107, and 110 are rejected under 35 U.S.C. 102(e) as being anticipated by Boutros et al, U.S. Patent 6,635,507.

As seen in Figure 8, and with respect to independent claims 93 and 107, Boutros et al teaches a multijunction solar cell comprising a Ge substrate (802); a first region including the N and P GaAs layers (804) which form a first junction of the multijunction solar cell and the N and P GaInP layers (806) which form a second junction of the multijunction solar cell, wherein this first region includes the portion of said N and P GaAs layers (804) and the portion of the N and P GaInP layers (806) not directly below, but to the right of the GaAs cap layer. In a second region, the portions of corresponding N and P GaAs layers (804) and N and P GaInP layers (806) directly below the GaAs Cap support the bypass diode (810) to protect the cell against reverse biasing (see also col. 1, lines 16-22; and col. 7, lines 47-65). With respect to claims 47 and 90, these claims require that the top layer of the top cell has a first polarity and that the bottom layer of the bypass diode has the first polarity. In Figure 8, it is the Examiner's position that the GaAs N^{++} layer can be considered to by the lower layer of the bypass diode, and thus, has the same polarity as the upper N-type GaInP layer of the upper solar cell. Indeed, as seen in Boutros et al's Figures 2A, 3A, and 4A, the bottom layer of the bypass diode (210, 310, 410) is N^{++} and is the same polarity, i.e., N-type, as the top layer (208, 308, 408) of the solar cell. With respect to claims 97 and 107, when the GaAs P^{++} layer is considered the lateral conduction layer (as per instant claims 96 and 110), then the bypass diode above it reads on the instant etch stop layer. Alternatively, with respect to claim 97 and 107 when the GaAs Cap N^{++} layer is considered the lateral conduction layer, then the GaAs P^{++} layer reads on the instant etch stop layer.

With respect to claim 98, and as clearly seen in said Figure 8, the Ge substrate (802) forms an electrical connection path between the multijunction solar cell and the bypass diode.

In an alternative with respect to claim 107, the N and P GaAs layers (804) and N and P GaInP layers (806) encompass the instant first region, and the bypass diode (810) encompasses the instant second sequence of layers.

Since Boutros et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

12. Claims 47, 48, 65, 66, 68, 69, 86, 87, 89-91, 93, 95, 97-101, 103, 104, and 106-108 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 9-64397, herein referred to as JP '397.

JP '397's solar module in Figure 2 comprises a conductive substrate (203); a multijunction solar cell (201) having first (204A, 205A, 206A) and second (204B, 205B, 206B) subcells formed on a first portion of the substrate; bypass diode (202) formed on a second portion of the substrate (203) having p-type, i-type and n-type layers (205A, 204B, 207D); and metal contact layers (208, 208D) (see also paragraphs 0031 to 0045). As seen in Figure 2, the bypass diode (202) is clearly integral with and laterally spaced apart from both the first and second subcells. With respect to the limitation in claim 37 that the bypass device and the subcell have identical sequences of layers with substantially the same thickness and form an integral semiconductor body, it is seen that JP '397's multijunction solar cell solar cell in Figure 1 has transparent electrode (107) followed by collection electrode (108). This is the same sequence as in the

bypass diode, which has transparent electrode (107D) followed by collection electrode (108D). JP '397's multijunction solar cell and bypass diode form an integral semiconductor body on the substrate (103). With respect to independent claims 47 and 90, the top layer (104A) of the top cell in Figure 1 can be p-type, and the bottom layer (104D) of the bypass diode can also be p-type (see paragraphs 0033, 0034, and Example 2 where a pinpin structure is used for the multijunction solar cell, i.e., layer 104A is p-type, and the bypass diode is ip structure, i.e., layer 104D is p-type). With respect to claim 93, JP '297's conductive substrate (103) in Figure 1 reads on the instant planar lateral conduction layer. With respect to claim 100, JP '397's Figures 1 and 2 anticipate this claim because a "corresponding" sequence encompasses the situation in these figures. In particular, each layer in the bypass diode has a "corresponding" layer in the multijunction solar cell in said figures. With respect to claim 107, as seen in JP '397's Figure 3, there is a substrate (303) that has a sequence of semiconductor layers, the lower portion of the sequence, i.e., layers (304A) to (306B) that forms the multijunction solar cell, and the upper portion of the sequence, i.e., layers (350D, 304D) that forms the bypass diode. In said Figure 2, conductive layer 308 reads on the instant highly conductive layer.

With respect to claims 48 and 91, as clearly seen in Figure 2, the sequence of layers of the subcells and the sequence of layers of the bypass diode would clearly be grown in the same process step.

With respect to claims 65, 86, 99, and 108, the metal lead wire (209,309) together with the metal contact (208D,308D) read on the instant metal contact.

With respect to claims 66, 93, 100, and 107, the substrate (303) is also a lateral conduction layer. With respect to claim 95 and in the alternative, the lateral conduction layer can be considered to be semiconductor layer (304A), which is doped either n-type or p-type (see paragraph 0025).

With respect to claim 68 and 97, any of the layers (304A to 307) above the substrate (303), or any of the layers (305A to 307) above layer (304A) reads on the instant stop etch layer.

With respect to claim 89, as clearly seen in Figure 3, the sequence of layers of the subcells and the sequence of layers of the bypass diode would clearly be grown in a different, subsequent process step.

Since JP '397 teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

13. Claims 47-57, 59, 61, 65-68, 70, and 86-111 are rejected under 35 U.S.C. 102(b) as being anticipated by Ho et al, WO 99/62125. In particular, see Figures 12 and 14B, and page 8, lines 16-23, which teach the claimed invention.

Ho et al's multijunction solar cell has a first portion at the left having a first GaAs subcell (1412-1416) and a second GaInP subcell (1422-1426); and a second portion laterally spaced apart from the first portion by a trough and including bypass diode (1410) that is integral with said first subcell (see Figure 14B; and page 8, lines 18-23). The diode (1410) includes a metal/semiconductor contact comprising front metal contact (1440), which, it is the Examiner's position, forms a Schottky junction with the tunnel diode layer N^{++}. The solar cell has a Ge substrate (1402-1404) (see Figure 14B).

The combination of Ho et al's metal contact (1436) and front metal contact (1440) reads on the instant metal layer. The tunnel diode layers (1418) and (1420) in both said first and second portions in said Figure 14B read on the instant lateral conduction layer. As seen in Ho et al's 14B, the topmost layer of the topmost cell is n-type Ge substrate (1402) which is of the same polarity as the bottom n^{++} tunnel diode layer (1420) of the bypass diode (1410). With respect to claim 50, the bypass diode and the GaAs subcell have the same sequence of layers and the same composition and thickness, as seen in said Figure 14B. With respect to claim 86, said Figure 14B clearly has first and second portions, the first portion having the solar cells, and the second portion having the overlying bypass diode (1410). With respect to claim 93, the front metal contact (1440) in said Figure 14B reads on the instant planar lateral conduction layer. With respect to claim 100, as seen in said Figure 14B, front metal (1436) is a lateral conduction layer that is physically separated from front metal (1440), which is another lateral conduction layer. With respect to claim 107, see Ho et al's Figure 12, where there is a cascade solar cell at a lower portion, a bypass diode (1214, 1216) at an upper portion, GaAs connecting layer (1210) which reads on the instant highly conductive lateral conduction layer, and layer (1222) which corresponds to the metal layer in instant claim 108 (see also page 7, line 16). The solar cell can be multijunction (see page 5, lines 15-20). Since Ho et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

14. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

15. Claims 47-68, 70, and 86-111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boutros et al (U.S. Patent 6,635,507) in view of Ho et al (WO 99/62125).

As seen in Figure 8, and with respect to independent claims 47, 65, 86, 90, 93 and 107, Boutros et al teaches a multijunction solar cell comprising a Ge substrate (802); a first region including the N and P GaAs layers (804) which form a first junction of the multijunction solar cell and the N and P GaInP layers (806) which form a second junction of the multijunction solar cell, wherein this first region includes the portion of said N and P GaAs layers (804) and the portion of the N and P GaInP layers (806) not directly below, but to the right of the GaAs cap layer. In a second region, the portions of corresponding N and P GaAs layers (804) and N and P GaInP layers (806) directly below the GaAs Cap support the bypass diode (810) to protect the cell against reverse biasing (see also col. 1, lines 16-22; and col. 7, lines 47-65). Said first and second regions in said Figure 8 clearly are laterally spaced apart, as in claims 47 and 90. With respect to claims 66, 68, 70, 97, 107, when the GaAs P^{++} layer is considered the lateral conduction layer, then the bypass diode above it reads on the instant etch stop layer. Alternatively, with respect to claims 97 and 107 when the GaAs Cap N^{++} layer is considered the lateral conduction layer, then the GaAs P^{++} layer reads on the instant etch stop layer. As seen in Figure 8, there is a connecting electrical contact (816) deposited on a portion of the substrate (802) and over a portion of the bypass diode

(i.e., over a portion of the second region). Clearly, this electrical contact is for shorting the multijunction solar cell (in both regions) and to electrically connect to said bypass diode in the second region.

With respect to claims 47 and 90, these claims require that the top layer of the top cell has a first polarity and that the bottom layer of the bypass diode has the first polarity. In Figure 8, it is the Examiner's position that the GaAs N^{++} layer can be considered to by the lower layer of the bypass diode, and thus, has the same polarity as the upper N-type GaInP layer of the upper solar cell. Indeed, as seen in Boutros et al's Figures 2A, 3A, and 4A, the bottom layer of the bypass diode (210, 310, 410) is N^{++} and is the same polarity, i.e., N-type, as the top layer (208, 308, 408) of the solar cell.

With respect to claims 48 and 91, when Boutros et al's sequential deposition steps (col. 8, lines 4-46) are considered a growth step, then the layers of the multijunction solar cell and bypass diode are grow sequentially in the same process step, i.e., the process step is the sequential growth of the layers. After the growth step, there is etching (see col. 8, lines 37-46).

With respect to claim 89, and in an alternative with respect to the immediately preceding, the first and second solar cells (804,806) can be considered to be grown in a first process, and then the bypass diode (810) can be considered to be grown in a second process after the first process.

With respect to claim 88, there is a trough between Boutros et al's bypass (810) and the contact (818), and thus, there is a trough between first and second portions as here claimed.

With respect to claims 93, 94, 100, and 109, Boutros et al's contact (818) reads on the instant planar lateral conduction layer deposited over the sequence of layers in the second region. The uppermost GaAs cap of the bypass diode reads on the lateral conduction layer in the first region that is separated from the lateral conduction layer in the first region.

With respect to claim 98, and as clearly seen in said Figure 8, the Ge substrate (802) forms an electrical connection path between the multijunction solar cell and the bypass diode.

Boutros et al teaches the limitations of the instant claims other than the difference which is discussed below

With respect to claims 65 and 86 (and their dependent claims), and also with respect to claims 99 and 108, Boutros et al does not specifically teach that said connecting contact (816) can be made from metal (i.e., instant metal layer). However, as shown by reference sign (1436) in Figure 14B of Ho et al, it is well-known and conventional in the solar cell art to form connecting solar cell contacts from metal (see also page 8, lines 18-23). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared Boutros et al's connecting contact (816) from metal because it is well-known and conventional in the art to do so, as shown by Ho et al.

Double Patenting

16. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11

F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

17. Claims 37-73 and 86-111 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-35 of U.S. Patent No. 6,864,414. Although the conflicting claims are not identical, they are not patentably distinct from each other because although not of the same scope as the instant claims, the claims of said copending application are anticipatory of the instant claims.

18. Claims 47-59, 61, 65-68, 70, and 90-111 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 48-98 of copending Application No. 10/723,456. Although the conflicting claims are not identical, they are not patentably distinct from each other because although not of the same scope as the instant claims, the claims of said copending application are anticipatory of the instant claims.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

19. Claims 47-59, 61, 65-68, 70, and 90-111 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-35

of U.S. Patent No. 6,680,432. Although the conflicting claims are not identical, they are not patentably distinct from each other because although not of the same scope as the instant claims, the claims of said patent are anticipatory of the instant claims.

20. Claims 37-73 and 86-111 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-12 of copending Application No. 11/247,828. Although the conflicting claims are not identical, they are not patentably distinct from each other because note in claim 2 of said copending application wherein the sequence of layers of semiconductor material forms at least one cell of a multijunction solar cell and also forms the bypass diode.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

21. Claims 37-73 and 86-111 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 31, 32, and 34-75 of copending Application No. 10/336,247. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of said copending application have the instant multijunction solar cell and bypass diode.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

22. Claims 37-73 and 86-111 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. 11/280,379. Although the conflicting claims are not identical, they are not patentably distinct from each other because note in claim 2 of said

copending application wherein the sequence of layers of semiconductor material forms at least one cell of a multijunction solar cell and also forms the bypass diode.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

23. Claims 37-73 and 86-111 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-27 of U.S. Patent No. 6,600,100. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of said patent have the instant multijunction solar cell and bypass diode.

24. Claims 37-73 and 86-111 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,278,054. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of said patent have the instant multijunction solar cell and bypass diode.

Response to Arguments

25. Applicant's arguments filed November 7, 2005 have been fully considered but they are not persuasive.

Applicant argues that the integral bypass diode in Boutros et al protects an adjacent semiconductor cell, not the same cell on which the bypass diode is integrated, and cites col. 6, line 56 to col. 7, line 12, and Figure 5 of Boutros et al. Applicant argues that "if there was not an array of cells, but only one solar cell, the bypass diode of

Boutros et al would not be connected to that solar cell, and thus, the bypass diode disclosed in Boutros [et al] would not function to protect the sole solar cell." Applicant argues that in the present invention, the bypass diode protects the same semiconductor cell which it is fabricated with in the same semiconductor body. However, this argument is not deemed to be persuasive because it is Figure 8 of Boutros et al, not Figure 5 or Figure 5's discussion at col. 6, line 56 to col. 7, line 12, that is pertinent to the instant claims. In Figure 8, the bypass diode (810) protects cells (804) and (806) that are integrated beneath it. There is also clearly illustrated in Figure 9, which is a schematic of the structure in Figure 8. Indeed, Boutros et al teaches that "bypass diode **810** is connected in an anti-parallel configuration with the series connection of cells **804** and **806**" (see the sentence bridging cols. 7 and 8).

With respect to JP '397, Applicant provides arguments that the solar cell in JP '397 does not have the limitation of "an identical sequence of layer where each layer in the solar cell has the same composition and thickness as the corresponding layer in the bypass diode." However, this argument is not deemed to be persuasive because said limitation is not in any of the claims currently rejected over JP '397.

Applicant argues that claim 47, and claims 50, 65, 90, 93, and 100 recite that the top layer of the top cell has the same polarity as the bottom layer of the bypass diode. Applicant argues that "the top layer (1426) of the top cell of Ho [et al] is positive and the bottom layer of the bypass diode (1410) is negative." However, this argument is not deemed to be persuasive because, as seen in Ho et al's 14B, the topmost layer of the

topmost cell is n-type Ge substrate (1402) which is of the same polarity as the bottom n^{++} tunnel diode layer (1420) of the bypass diode (1410).

Conclusion

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6,359,210 is hereby made of record.

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Alan Diamond
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Art Unit 1753

Alan Diamond
January 19, 2006